

Environmental Infrastructure for Sustainable Cities: Policy to Plan to Implementation

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Spring 2021
Week 1 | January 11, 2021

Agenda

1. Overview and introductions
2. Class design and approach
3. Context
4. Concept of environmental infrastructure
5. Infrastructure's importance to cities, economies, the environment and public health
6. Impacts of Covid
7. Class overview
8. Office hours

Overview and Introductions

- Class goals, your learning goals
- Expectations and Covid-era norms

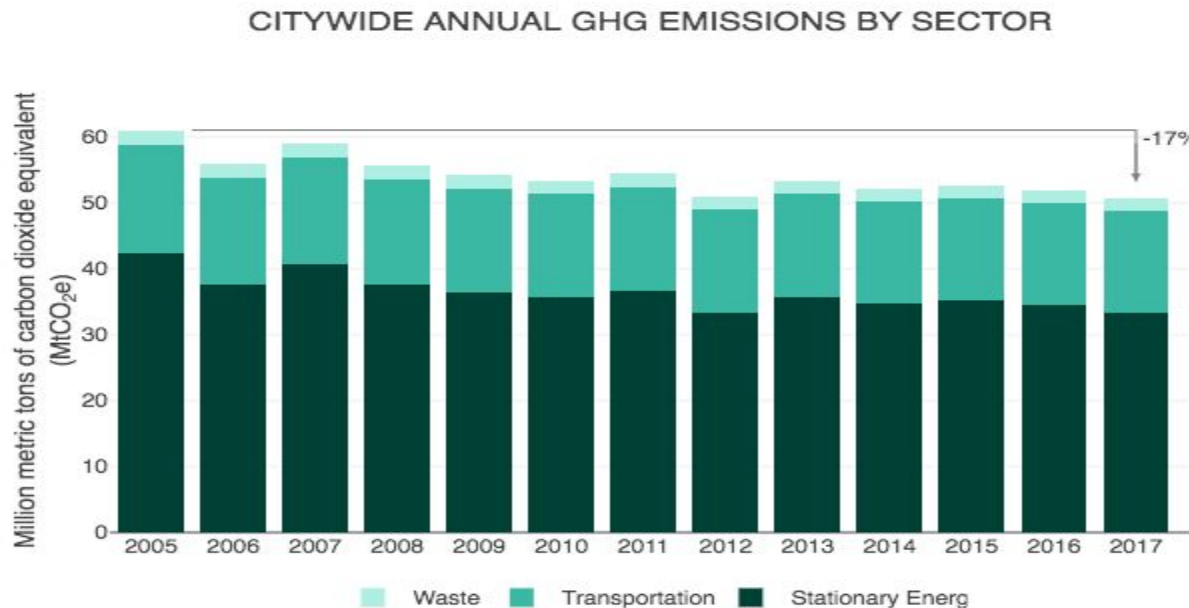


Polls

- Goals?
- Experience working with infrastructure?

Overview and Introductions

- This class will focus on physical infrastructure
 - “Non-design” ways to encourage sustainable behavior
 - Policy to Plan to Implementation
- Even established cities such as NYC are not done being built
 - How do we accommodate this growth in a sustainable fashion?
- How does Covid change things?



Source: NYC.gov

Class Design / Approach

- Policy to Plan to Implementation:
 - Big picture thinking – how can I make the world a better place
 - Systems approach -- identifying environmental problems and structural solutions that are replicable, scalable, and practical
- See hidden infrastructure all around
- Readings -- what you find interesting, leave lasting impressions
- Forum & Class Discussion
- Projects
- Focus is on the United States, but does not have to be exclusive
- Covid impact on class: online forum, shorter lectures, infrastructure tour is self-guided
- Questions?

Polls

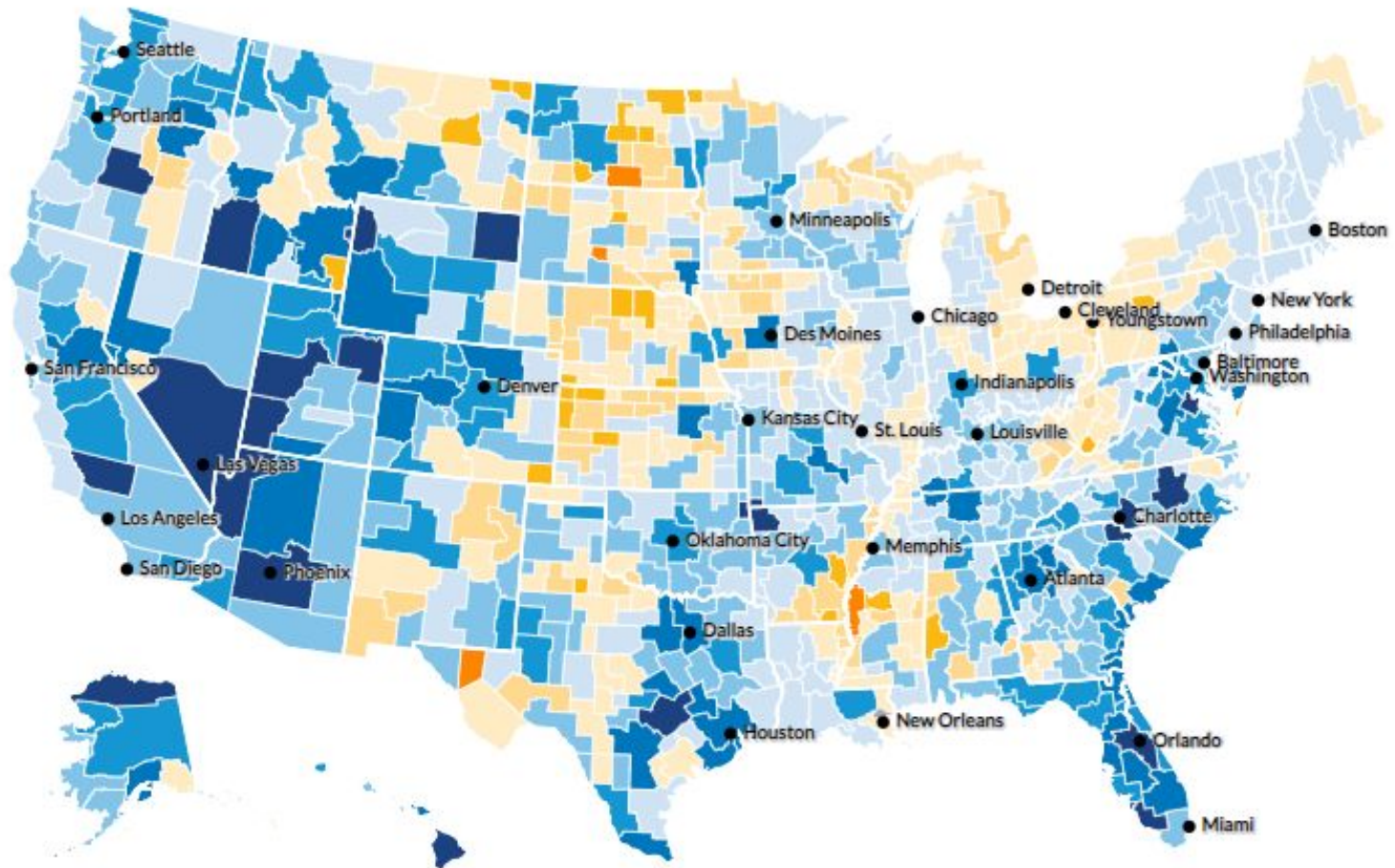
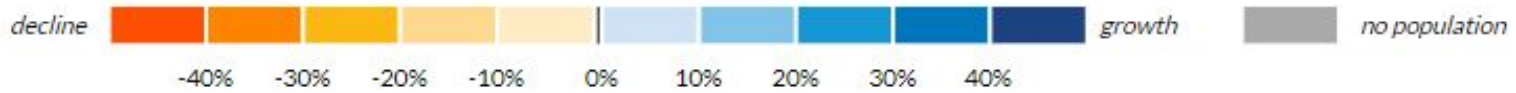
- Have you read the syllabus?

Context: an increasingly urban, coastal world

- Widespread changes in land use and climate change
 - Population growth
 - Migration, especially rural to urban, also interior to coasts



Context: U.S. Growth Patterns



Land use trends and density

- Why is density important?
- Open space/forest
- Agricultural
- Urban

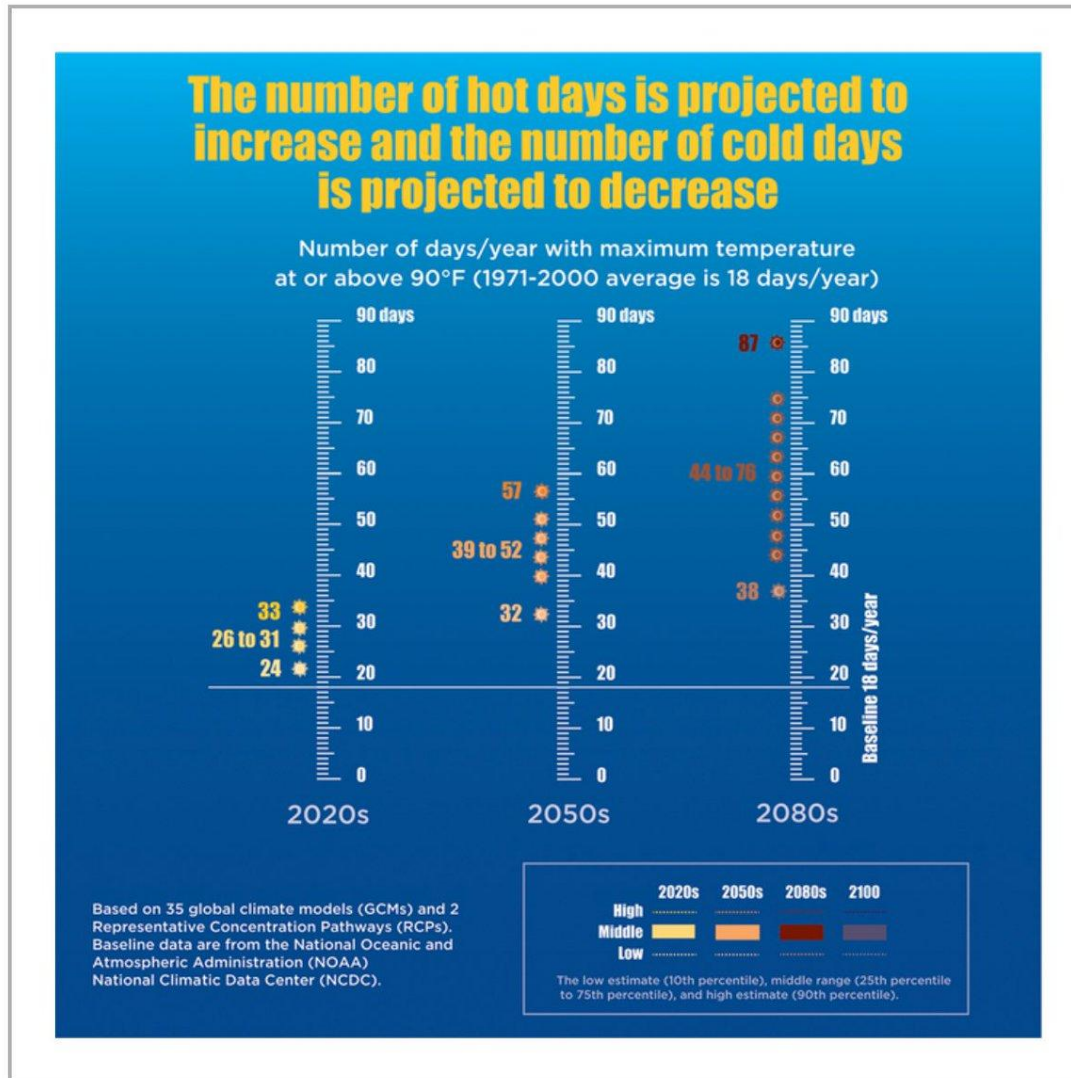


Climate change: IPCC data and predictions

The UN Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2013) and Special Report (Oct. 2018):

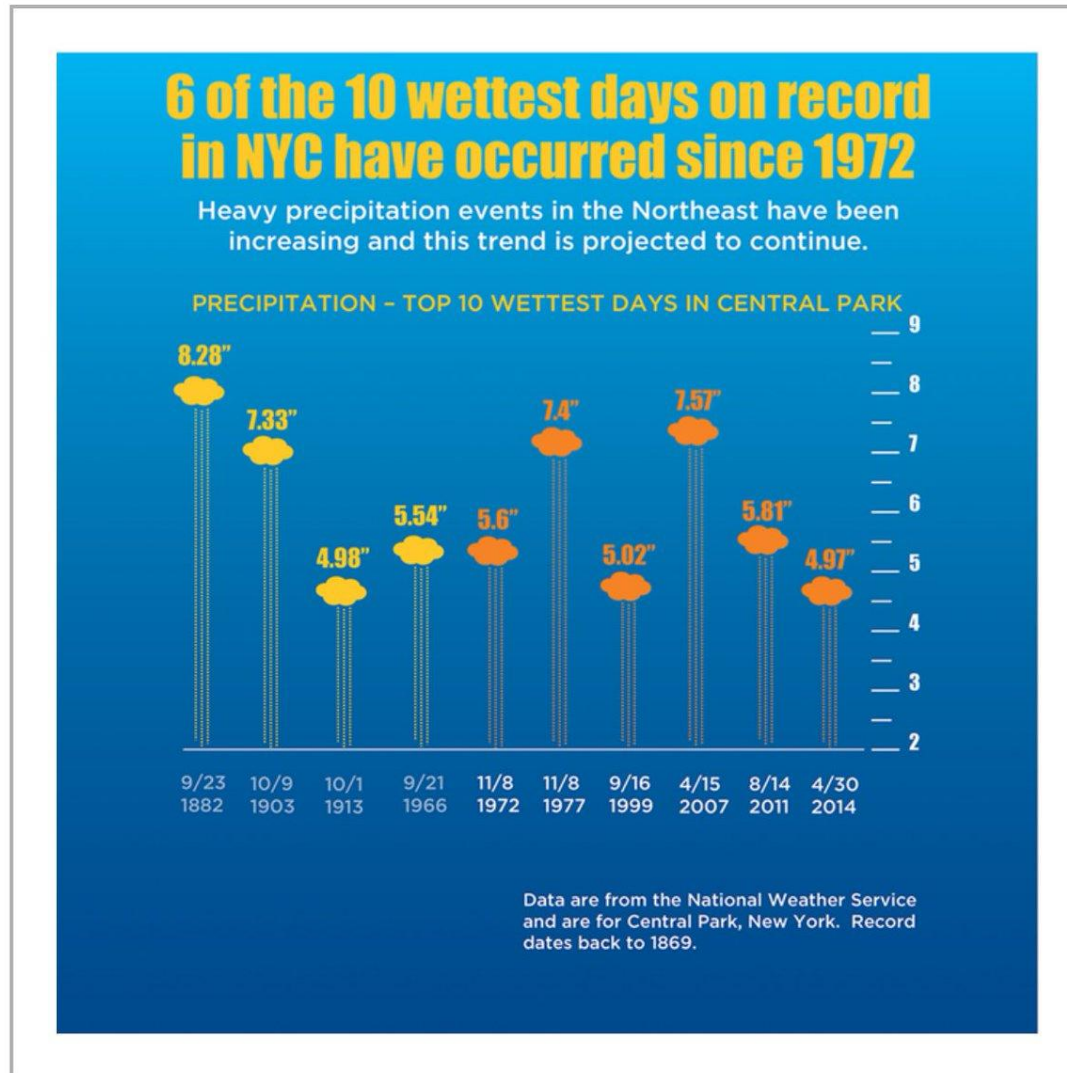
- From 1880 to 2012, the average global temperature increased by 0.85 °C.
- Oceans have warmed, snow and ice have declined and seas have risen.
 - From 1901 to 2010, the global average sea level rose by 19 cm as oceans expanded due to warming and ice melted, and Arctic sea ice has shrunk in every successive decade since 1979.
 - Average sea level rise is predicted to be 24–30 cm by 2065 and 40–63 cm by 2100.
- Many of the adverse impacts of climate change will come at the 1.5°C mark, before the 2°C target.
 - Limiting global warming to 1.5°C would require rapid, far reaching and unprecedented changes in all aspects of society, and **could** go hand in hand with ensuring a more sustainable and equitable society.
 - Global net human-caused emissions of CO₂ would need to fall by about 45% from 2010 levels by 2030, and reach ‘net zero’ in 2050.

Climate Change: NPCC Predictions for NYC

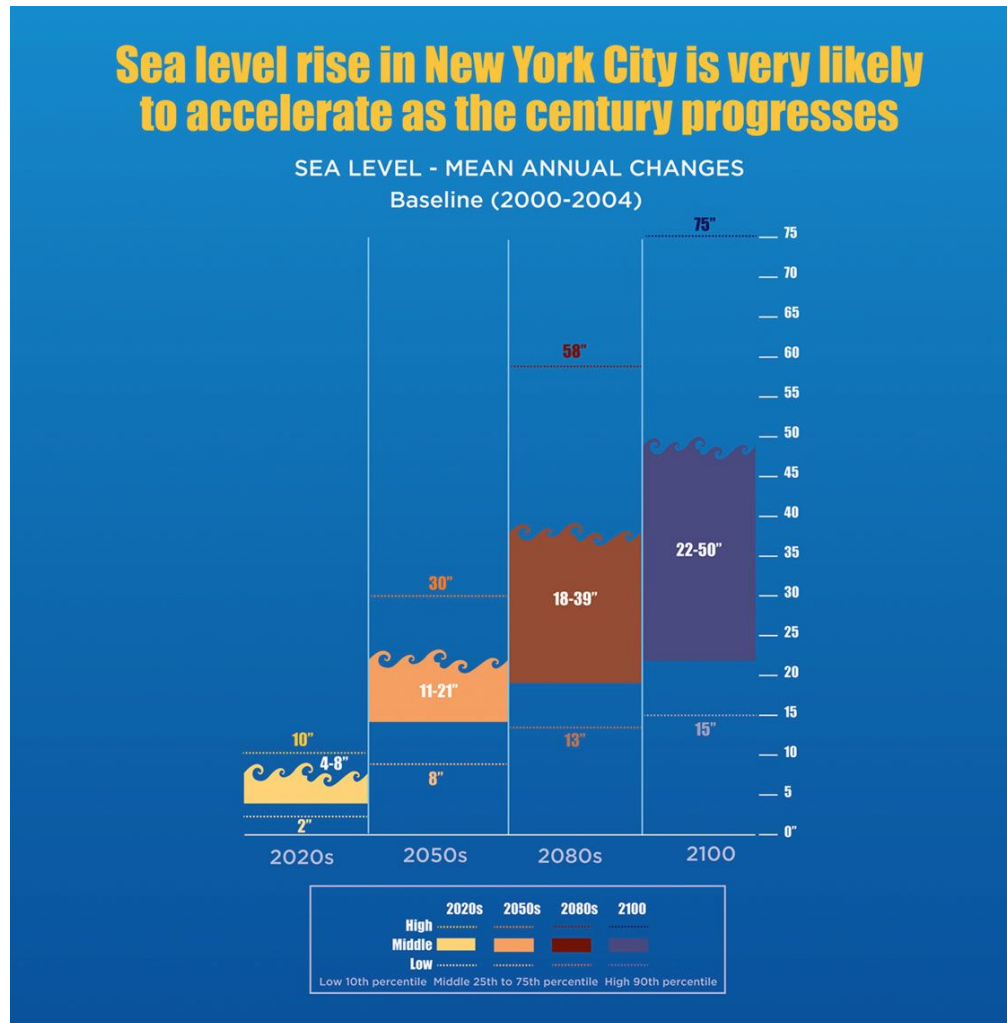


Source: *The New York City Panel on Climate Change (NPCC)*

Climate Change: NPCC Predictions for NYC

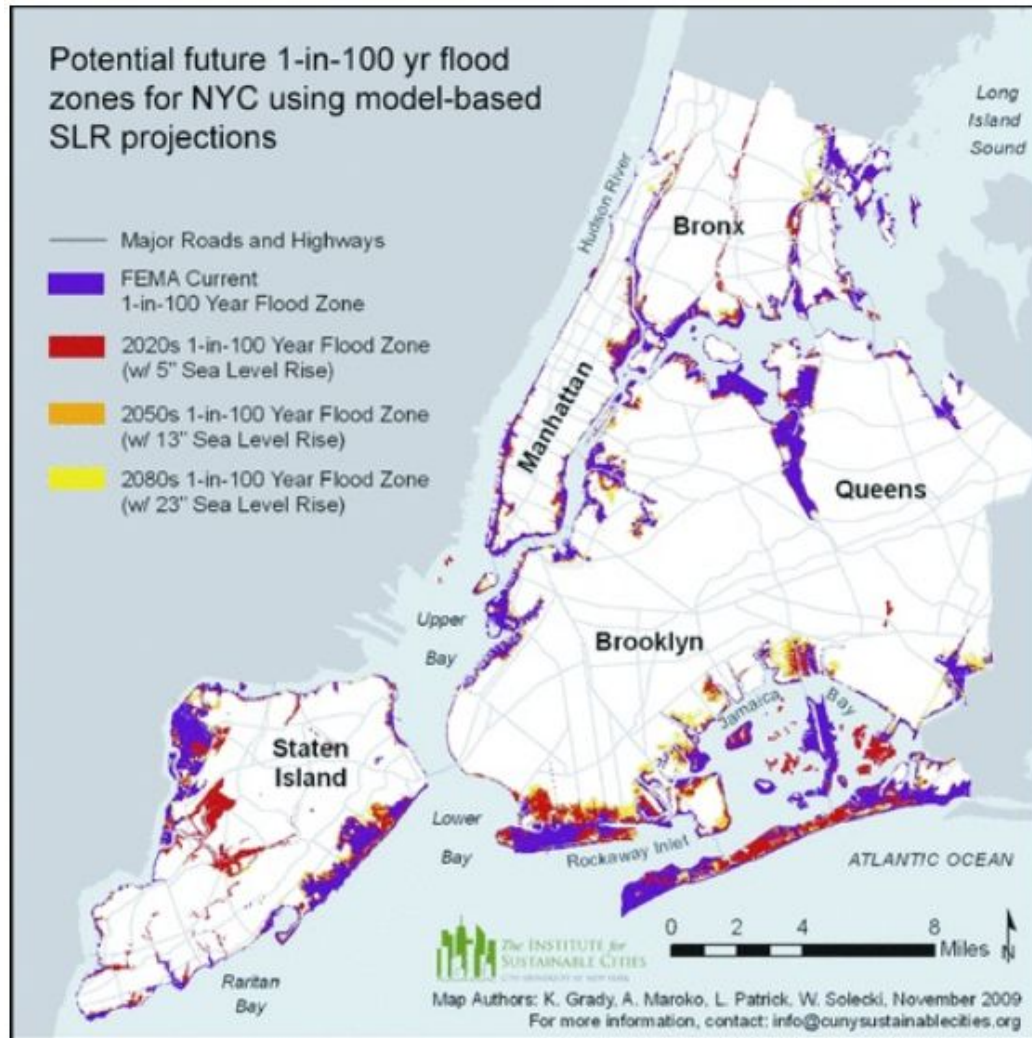


Climate Change: NPCC Predictions for NYC



Source: The New York City Panel on Climate Change (NPCC)

Climate Change: NPCC Predictions for NYC



Source: The New York City Panel on Climate Change (NPCC)

Climate Change: Hurricane Sandy

- Hurricane Sandy exposed much of NYC's weak infrastructure
- Battery Park flooded up to 9 feet
- 17% of NYC land mass under water
- 43 out of 72 deaths from the storm took place in NYC
- 2,000 damaged homes, 2 million without power



Environmental approaches

- Preservation/conservation vs. restoration of natural systems
- Command & control vs. pollution charges, other economic incentives
- Investment, design & construction in infrastructure
- Behavioral & consumer issues



What are advantages and disadvantages of each approach? How do they interact?

Infrastructure and its role

- Defining infrastructure
- *Reading: "Why the Post Office Makes America Great." New York Times*
- What kinds of infrastructure are there? Why are they important?
- Discussion: What “hidden” infrastructure is the most important to your daily life, yet you don’t think about on a day-to-day basis?
- Working understanding of public “environmental infrastructure”



Infrastructure and Development (U.S.)



Goods to Market, Develop Land

- National Road
- Gallatin Plan
- Erie Canal
- Railroads
- Panama Canal



Infrastructure and Development (U.S.)



Build Cities

- Water
- Power/Electricity
- Light
- Heat

Move People

- Interstate Highways
- Airports
- Transit

Address Pollution

- Clean Water Act
- Clean Air Act
- Solid Waste

Cities and sustainability

- Discussion: are cities good for the environment?
- *Reading: Owens, David. "Green Manhattan." The New Yorker*
 - Density
 - Is sprawl the most important measure?
 - Do you agree with his statement that making cities more “livable” through more parklands and the like undercuts sustainability?
- What might have to happen for the rest of the U.S. to look like Manhattan (and the denser parts of NYC)?
- Are most cities sustainable now? Will they be in the future?

Sustainable development and infrastructure

- United Nations Conference on Sustainable Development (2012) (“Rio+20”) and Sustainable Development Goals:

“Sustainable urbanization requires that cities generate better income and employment opportunities; expand the necessary infrastructure for water and sanitation, energy, transportation, information and communications; ensure equal access to services; reduce the number of people living in slums; and preserve the natural assets within the city and surrounding areas.”



Image source: 100 Resilient Cities

- *Readings: Infrastructure for Sustainable Development*

Cities and their connection to rural areas

- *Readings: Future Shock in the Countryside, Darren Anderson, The Atlantic*
- Infrastructure is vital for dense concentrations of people, but that population inherently relies on low density, rural areas
 - Energy, water, landfills, server farms, etc.
- Federal role in policy and investments
- No place on earth is now free of human impact (the “End of Nature”)



Image source: KPBS

Low carbon infrastructure and public health

- *Readings: Bloomberg, Michael R., and Rohit T. Aggarwala. "Think Locally, Act Globally." American Journal of Preventive Medicine 35.5 (2008): 414-23*
- Concept of co-benefits
- Cities are the solution, but also a problem as producers of GHG



Image source: Fodors

Infrastructure response to health crises

- *Reading: Pandemics Have Actually made Cities Better*
- Is fear of living in density warranted?
- New and improved infrastructure as a springboard for growth
- Past epidemics have spurred infrastructure development; are water-borne illnesses easier to address than human-to-human, airborne infections?



Image source: NYTimes

Questions for next class

- Why don't we have more infrastructure development?
- What support is needed for infrastructure development today, and how would you mobilize support?
- Do we need special events like the Olympics to generate public support for infrastructure development?
- What did you find most provoking in the readings?
- What did you find least compelling in the readings?